Waquoit Bay National Estuarine Research Reserve

Project Partners:

US Fish and Wildlife Service
Massachusetts Division of Marine Fisheries
Mashpee and Falmouth natural resource agencies

Massachusetts Fish and Game
Mashpee Wampanoag Tribe
Trout Unlimited

December 16, 2010
Stream Systems:
- Childs River
- Bourne Pond
- Quashnet River
- Red Brook
- Dutchman’s Creek
- Abigails Brook
- Flat Pond
Restoration Opportunities:

- Diadromous Fish Habitat
- Cold Water Fish Habitat
- Freshwater Wetland
- Tidal Wetland
- Watershed Approach
Spring Sapping Valleys
(from: Schwarzman 2002 and Finch-Cape Cod)
Watershed Approach to Restoration

Cranberry Production
Watershed Approach to Restoration

Cranberry Production

Quashnet Bogs

Watershed Impacts
- Channel straightening
-Disconnected floodplains
- Loss of woody material/riparian forest
-Elevated water temperatures
-Impounded conditions
-Lack of flow regime diversity
-Obstructions/loss of connectivity
**Components**

**Data Gathering/Site Visits**
• Historical mapping/photos
• Previous studies
• On-going research
• Personal communications
• Field reconnaissance

**Restoration Master Plan**
• Data inventory/compilation
• Prioritization
• Recommendations

**Public Meeting**

**Conceptual Design of Priority Sites**

THE Louis Berger Group, INC
Inventory of Potential Sites

Childs River 12
Bourne Pond 2
Quashnet River 16
Red Brook 5
Dutchman’s Creek 2
Abigails Brook 4
Flat Pond 1
## Restoration Priority Criterion

**Ecological**
- Obstructions/loss of connectivity
- Restoration area (fish/wildlife)
- Existing populations
- Stream flow/hydrology
- Water quality
- Multiple environmental benefits

**Feasibility**
- Local support
- Ownership
- Complexity (construction/regs)
- Cost/Funding sources

**Education/Recreation**
- Public access
- Proximity to schools
- On-going research
Priority Restoration Opportunities

- Lower Childs River-Carriage Shop Dam
- Middle Quashnet River-Abandoned Bogs
- Upper Quashnet River-Bog Complex
- Abigails Brook
Current issues:

- Existing fishway in poor condition
- Falmouth Rod & Gun Club ponds very shallow with extensive aquatic vegetation growth and sediment accumulation
- Impoundment acts to increase water temperatures in brook trout stream with most trout occurring below dam

Riverways study (Milone & MacBroom 2008) recommended full dam removal at cost of up to $575,000

Other options include:

- Replacement of existing fishway with new “technical” fishway (such as Denil, but upstream herring passage not a major objective for river)
- Partial dam removal with conversion of existing fishway channel to nature-like fishway, lower pond level, create new stream channel, wetland restoration (preferred)
Childs River – Carriage Shop Dam

- Creates stream habitat in new stream channel in former pond, and in nature-like fishway
- Provides for fish passage at the site for river herring, trout, and other species
- Allows for restoration of scrub-shrub and forested wetland in former pond
- Lower cost than full dam removal
Nature-like fishway:

- Estimated head – 4 feet
- Slope – 20:1 to 30:1 depending on topography and head
- Length – 80 to 120 feet, drop per pool approx. 6 inches
- Width – 15 to 20 feet
- Rock/boulder weirs with interspersed instream boulders and cobble/gravel substrate in pools
- Design flow – 15 to 20 cfs -based on average monthly flows on the Quashnet River – max. annual flows on Quashnet typically 30 to 40 cfs. (Design flows to be prorating by drainage area)
- Current outlet from pond to be replaced and stabilized
Childs River – Carriage Shop Dam

Nature-Like Fishway

POOL SECTION B-B'
Current issues:

- Several water control structures remain from past cranberry operations
- Open for fish passage
- Potential for structural failures
- Impediments to river connectivity and wildlife passage in river corridor
- Potential for flow restriction/impounding of flows
- Channel location/spring seeps

Lower Quashnet River bogs abandoned and purchased by Division of Fisheries and Game – 1956 (picture of David Leonowicz near Martin Rd., 1953)
Middle Quashnet River

1950’s Aerials
Middle Quashnet River

Restoration Opportunities
Potential Restoration Measures:

• Regular inspection & maintenance program to ensure structures are open

• Removal of failing concrete structures, leave associated berms in place

• Removal of concrete structures and berms, river corridor restoration

• Those to remain subject to regular inspections

• In-stream habitat enhancement

• Restore natural stream process, function and values (self-sustaining)
Upper Quashnet River
Impairments:

- Cutting of white cedars, shingle mill dam, cranberry cultivation (mid-1900’s)
- Ethylene Di-bromide (EDB) Treatment
- Channel straightening
- Disconnected floodplains
- Loss of woody material/riparian forest
- Elevated water temperatures
- Loss of wetland habitat
- Lack of flow regime diversity
- Obstructions/loss of connectivity
Upper Quashnet River

Reference Wetlands

Atlantic White Cedar Swamp

Red Maple Swamp
**Upper Quashnet River**

**Restoration components**

- Restore natural stream alignment, width, depth, slope, and substrate (sand/gravel with upwelling cool water)
- Stream flow regime/diversity
- Bank stability
- Establish forested wetland/riparian forest/shading
- Logs and root wads
- Restore wetland hydrology (elevate groundwater-grade controls/plug ditches)
- Modify bog surface
- Atlantic white cedar/red maple plantings
- Planting/Deer exclusion fencing
Eel River - Plymouth

Photos Courtesy of Alex Hackman, MA DER
Abigails Brook

Impairments:

- Tidal Restriction
- Obstructions/loss of connectivity
- Invasive species
- Channel straightening
- Disconnected floodplains
- Fish run potential (Fells Pond)
Next Steps:

• Finalize Master Plan
• Complete Conceptual Design of Priority Projects
• Public outreach-build support
• Seek funding opportunities to advance design and implementation